REMARKS

Claims 1-22 are pending in the application. Claims 1, 6, 11 and 16 have been amended and new claims 21 and 22 have been added by way of the present amendment. Reconsideration is respectfully requested.

In the outstanding Office Action, claims 1-20 were rejected under 35 U.S.C. Section 103(a) as unpatentable over Applicant's admitted prior art (AAPA), including the paper by Liu, in view of U.S. Patent No. 6,785,341 (Walton et al). Reconsideration is respectfully requested.

35 U.S.C. § 103 Rejection

Claims 1-20 were rejected under 35 U.S.C. § 103(a) as unpatentable over AAPA by Liu in view of Walton et al. Reconsideration is respectfully requested.

Claims 1, 6, 11 and 16 have been amended to clarify the invention. In particular, claims 1, 6, 11 and 16 have been amended to recite the limitation:

> a memory subsystem that provides input values to the FFT unit and receives output results from the computation engine,
>
> wherein the input values for the FFT unit are stored in increasing-x, increasing-y and increasing-z patterns in the memory subsystem that allows a burst read of the memory subsystem to maximize throughput.

Support for the amendment is provided at least at page 5, lines 9-20 and shown at least in FIG. 1 of the original specification (i.e., PCT/US2004/020259) and are also disclosed at paragraph **[0020]** of US Patent Application Publication US2005/0154546. Therefore, the amendments raise no questions of new matter.

The AAPA by Liu discloses a pseudospectral time-domain (PSTD) algorithm that uses the fast Fourier Transform (FFT) and a perfectly matched layer (PML) to eliminate the wraparound effect of the FFT.[1] In particular, the AAPA by Liu disclose that both the field component (μ) and the partial derivative of the field component ($\delta\mu/\delta\eta$) are real functions that can be provided as a complex input for FFT and Inverse FFT processing in order to save time in computing the PSTD.[2] Further, the AAPA by Liu discloses defining a complex function ($\mu_c(j_x)$) in Equation (20) and the partial derivatives in Equation (21) as:

$$\mu_c(j_x) = \mu(j_x, j_y, j_z) + i\mu(j_x, j_y+1, j_z), \quad (20),$$

$$\delta\mu(j_x, j_y, j_z)/\delta x = \boldsymbol{R}[\delta\mu_c(j_x)/\delta x], \text{ and } \delta\mu(j_x, j_y+1, j_z)/\delta x = \boldsymbol{I}[\delta\mu_c(j_x)/\delta x] \quad (21),$$

where $\boldsymbol{R}$ and $\boldsymbol{I}$ denote the real and imaginary parts, respectively, of the complex function.[3]

However, the AAPA by Liu nowhere discloses, as amended claims 1, 6, 11 and 16 recite:

> a memory subsystem that provides input values to the FFT unit and receives output results from the computation engine,
>
> wherein the input values for the FFT unit are stored in increasing-x, increasing-y and increasing-z patterns in the memory subsystem that allows a burst read of the memory subsystem to maximize throughput.

That is, the AAPA by Liu nowhere discloses a memory subsystem wherein the input values are stored in "increasing-x, increasing-y and increasing-z patterns" and wherein the memory system is "burst read," as recited in the amended claims.

In addition, with respect to claims 2, 7, 12 and 17, the AAPA by Liu, and in particular, Equations (20) and (21) nowhere discloses the following Equation (1) that is recited in claims 2, 7, 12 and 17, as:

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[1] *Q. H. Liu*, "Large-Scale Simulations of Electromagnetic and Acoustic Measurements Using the Pseudospectral Time-Domanin (PSTD) Algorithm," IEEE Transactions on Geoscience and Remote Sensing, vol. 37, no. 2 (March 1999) at ABSTRACT.

$$E_{ab} = AE_{ab} + B(\delta H_c/\delta b) + CE_{ab}^{inc} \quad (1),$$

where a, b and c are directions (x, y or z), A, B and C are coefficients based on the material properties of a medium and E_{ab}^{inc} is the incident field associated with a node. That is, among other deficiencies, Equation (20) and (21) have no components that both: (1) correspond to A, B, and C, coefficients based on material properties of a medium; and (2) corresponds to the term E_{ab}^{inc}, as indicated in Equation (1) and as recited in amended independent claims 1, 6, 11 and 16 of the claimed invention. Thus, Applicant respectfully requests that any suggested relationship between Equation (20) and Equation (21) and the claimed invention be explicitly disclosed and demonstrated in any follow-on Office Action. Thus, it is respectfully submitted that the above Equation (1) is not at all consistent with Equations (20) and (21) of the AAPA by Liu, and therefore, the claimed invention patentably distinguishes over the AAPA by Liu.

In addition, the outstanding Office Action acknowledges other deficiencies of the AAPA by Liu and attempts to correct these deficiencies by combining Walton et al. with the AAPA by Liu. However, Walton et al. cannot overcome all of the deficiencies of the AAPA by Liu, as discussed below.

Walton et al. discloses a method and apparatus for processing data in a multiple-input multiple-output (MIMO) communication system utilizing channel state information.[4] In particular, Walton et al. discloses a block diagram for an orthogonal frequency division modulation (OFDM) system with a transmitter **110** that includes a modulator **122**, wherein the modulator **122** further comprises an Inverse Fast Fourier Transform (IFFT) **320**.[5] Further, Walton et al. discloses the OFDM system also has a receiver system **156** that includes a demodulator **154**, wherein the demodulator includes a Fast Fourier Transform (FFT) processor (not shown) that generates transformed representations of the input.[6]

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[2] *Id.* at page 922 and Section B entitled: "Use of FFT Algorithms."
[3] Id. at Equations 20 and Equation 21.
[4] *Walton et al.* at ABSTRACT.
[5] *Id.* at FIG. 3, refs. 110C, 122A, 122T, 320A, and 320C; column 7, lines 46-49; and column 8, lines 30-51.
[6] *Id.* at FIG. 5, refs. 154A, 154R, 156; column 15, lines 40-58.

However, Walton et al. nowhere discloses, as amended claims 1, 6, 11 and 16 recite:

> a memory subsystem that provides input values to the FFT unit and receives output results from the computation engine,
>
> wherein the input values for the FFT unit are stored in increasing-x, increasing-y and increasing-z patterns in the memory subsystem that allows a burst read of the memory subsystem to maximize throughput.

That is, Walton et al. nowhere discloses a memory subsystem wherein the input values are stored in "increasing-x, increasing-y and increasing-z patterns" and wherein the memory system is "burst read," as recited in the amended claims.

In addition, Walton et al. nowhere discloses as claims 2, 7, 12 and 17:

$$E_{ab} = AE_{ab} + B\delta H_c/\delta b + CE_{ab}^{inc},$$

where a, b and c are directions (x, y or z), A, B and C are coefficients based on the material properties of a medium and E_{ab}^{inc} is the incident field associated with a node. Thus, Walton et al. cannot cure all of the deficiencies of the AAPA by Liu. Therefore, it is respectfully submitted that neither the AAPA by Liu nor Walton et al., whether taken alone or in combination, disclose, suggest or make obvious the claimed invention and that claims 1, 2, 6, 7, 11, 12, 16 and 17, and claims dependent thereon patentably distinguish thereover.

New Claims

New claims 21-22 have been added to claim additional features of the invention. In particular, claims 21-23 are directed toward the method for computing the PSTD. In addition, new FIG. 2 is submitted in the form of a "New Sheet" submitted herewith to illustrate these limitations in the form of flow diagram. The specification has been amended to provide a brief description of this new FIG. 2. Support for the claims and FIG. 2 is provided at least at page 6, lines 7-24 of the original specification of PCT/US2003/020259 and is also disclosed at paragraph

[0022] of US Patent Application Publication US2005/0154546. Therefore, the new claims and new figure raise no question of new matter.

Conclusion

In view of the above amendment, applicant believes the pending application is in condition for allowance.

Applicant believes no fee is due with this response. However, if a fee is due, please charge our Deposit Account No. 22-0185, under Order No. 10354-00001-US1 from which the undersigned is authorized to draw.

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499027_1

Respectfully submitted,

By__/Myron Keith Wyche/_____
Myron Keith Wyche
Registration No.: 47,341
CONNOLLY BOVE LODGE & HUTZ LLP
1990 M Street, N.W., Suite 800
Washington, DC 20036-3425
(202) 331-7111
(202) 293-6229 (Fax)
Attorney for Applicant